THE BEES AND WASPS OF SCOLT HEAD ISLAND NATIONAL NATURE RESERVE, NORFOLK

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Scolt Head Island NNR, a 4-mile-long island lying just off the Norfolk coast, is part of the magnificent stretch of coastal habitats that extends as an almost uninterrupted series of nature reserves from Hunstanton to Sheringham. The island is a reserve of international importance (Ratcliffe, 1977), and its physiography and natural history have been intensively studied (see Steers, 1960). Detailed lists of the plant and bird species on the island are available (Steers, 1960), but there have been few thorough faunistic studies of the insects. Ellis (1960) gives a list of insects from the island, but the only two orders that have been studied in detail are the Lepidoptera (Ellis, 1960) and the Coleoptera (Welch, 1982; 1986). The present paper is an account of the aculeate bees and wasps of the island and is based almost entirely on collections made by the authors. The only previous published list of bees and wasps on Scolt Head appears to be that compiled by Ellis (1960): a list of 8 solitary and 10 social species (see also Ellis, 1976).

Scolt Head Island consists of a shingle ridge, running east–west parallel to the coast, from which a number of lateral ridges extend southwards enclosing areas of saltmarsh. These shingle ridges are covered by sand-dune, which occurs on the island in all stages of development. Perhaps the best area on the island for bees and wasps is the stretch of dunes from Beach Point through Long Hills and Wire Hills to the Hut, and from there west along Smuggler's Gap to opposite House Hills, roughly in the centre of the island. The south-facing Hut Bank below the Hut and the eroded mature dunes, known as Wire Hills, just south-west of the Hut are particularly rich collecting areas. The mature dunes at the eastern end of the island — Norton Hills — are also interesting, but have been less thoroughly studied.

Bramble (*Rubus fruticosus* agg.) provides abundant nest sites for stem-nesting aculeates. It occurs on mature dunes throughout the island and is particularly abundant around the Hut. The island is relatively rich in plants that provide nectar and pollen (see Chapman, 1960; Jane & White, 1976). The saltmarshes provide a small number of suitable species which can be extremely abundant at certain times of the year: these include *Armeria maritima* (Mill.) Willd., *Limonium vulgare* Mill., *Limonium humile* Mill., and *Aster tripolium* L., which is visited by the rare bee *Colletes halophilus* Verhoeff. The sand-dunes provide a wider range of suitable species. Of particular importance are *Euphorbia paralias* L., *Senecio jacobaea* L., *Rubus fruticosus* agg., *Eryngium maritimum* L., and *Taraxacum* spp. Eisikowitch and Woodell (1975) list 5 species of bee visiting *Armeria maritima*. Notes on associations with particular flowers are given in the detailed list of species.

Methods

The present paper is based on collections and observations made between 3.vii.81 and 5.viii.81, 30.vi.82 and 3.vii.82, and more sporadically over many years, mainly on field courses during the last week of July and the first 2 weeks of August. We have also visited the island twice in May, specifically to look for spring bees (22.v.83,

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10.v.84). Finally, stem-nesting species were found by collecting bramble stems containing immatures in the 1982/3 and 1983/4 winters. Nineteen such nests produced three species mentioned below and from an additional 11 nests, 35 specimens of the ichneumonid wasp *Perithous divinator* (Rossi) were the only wasps to emerge.

Sphecidae

Tachysphex pompiliformis (Panz.). Extremely common. We have also seen one male, collected 1.vi.36 (E.A. Ellis). Female caught carrying large nymph of *Chorthippus albomarginatus* (De Geer) (Orthoptera) to nest, 30.vii.81.

Tachysphex unicolor (Panz.). Not common. Hut Bank.

Crossocerus wesmaeli (Vander Linden). Not common. Hut Bank and House Hills.

Ectemnius continuus (F.). Rare. Male on Wire Hills, 24.vi.84.

Rhopalum clavipes (L.). Rare. Male reared from bramble stem collected 26.i.83. House Hills.

Oxybelus uniglumis (L.). Extremely common. Prey records: three muscids and one syrphid.

Pemphredon lethifer (Shuck.). Adults common on bramble leaves. From 15 bramble stem nests collected in 1983 and 1984 from Long Hills, Wire Hills, Hut Bank, House Hills and Norton Hills, 22 males and 12 females and one unsexed *P.lethifer* emerged. Nine larvae failed to develop, and 12 *Perithous divinator* (Rossi) (Ichenumonidae) also emerged.

Ammophila sabulosa (L.) Very common. A caterpillar of *Orgyia antiqua* (L.) (Lepidoptera) was excavated from one nest, 3.viii.81. It is unusual for such a hairy prey to be caught by *A.sabulosa.*

Podalonia affinis (Kirby). Very common on Hut Bank.

Podalonia hirsuta (Scop.). Very common on Hut Bank.

Gorytes tumidus (Panz.). Rare. Male on top of Hut Bank, 30.vi.82.

Pompilidae

Auplopus carbonarius (Scop.). Recorded by Ellis (1960), but not seen by us.

Priocnemis parvula Dahlb. Rare. Male collected 4.viii.75 (S.A. Corbet).

Pompilus cinereus (F.). Extremely common. Prey records: Two females on Hut Bank carrying immature *Arctosa* sp. (probably *perita* Latr.), 31.vii.81, 2.viii.81.

Arachnospila anceps (Wesm.). Rare. The only specimen we have seen was a male, collected 1.vi.36 (E.A. Ellis).

Evagetes crassicornis (Shuck.). Rare. One female, 3.vii.82.

Anoplius infuscatus (Vander Linden). Quite common.

Anoplius viaticus (L.). Extremely common. Females seen as early as 10.v.84.

Episyron rufipes (L.). Extremely common. Both sexes often feeding at *Euphorbia paralias* on Hut Bank. Three individuals caught with females of *Araneus diadematus* Clerck (31.vii.81–3.viii.81), a spider that builds webs on *Suaeda fruticosa* Forsk around the upper margins of Hut Marsh, close to the nest sites of *E.rufipes*. On 4.viii.81, a female *E.rufipes* was caught carrying a lycosid (immature *Arctosa* sp., probably *perita*), and on 14.viii.83, another specimen was caught with a larger *Arctosa* sp. Only three other records of *E.rufipes* capturing non-orb-weaving spiders exist: *Alopecosa* sp. (immature) (Richards and Hamm, 1939), *Arctosa* sp. (Eichler, 1953), and *Xysticus cristatus* (L.) (Thomisidae) (personal observation).

Vespidae

Vespula germanica (F.). Listed by Ellis (1960).

Eumenidae

Ancistrocerus scoticus (Curtis). Rare. Male and female on bramble, 6.ix.75. Ellis's (1960) record of '*A.trimarginatus*' presumably refers to this species, rather than to *A.trifasciatus* (Müller). A male specimen collected by Ellis (1.vi.36) and seen by us is of *A.scoticus*.

Chrysididae

Hedychridium ardens (Latr. in Coq.). Extremely common.
H. cupreum (Dahlb.). Rare. Wire Hills, 3.vii.82.

Halictidae

Lasioglossum minutissimum (Kirby). Uncommon. Wire Hills, Hut Bank.
L. punctatissimum (Schenk). Uncommon. Female on *Limonium binervosum* (G.E. Sm.) C.E. Salmon, 31.vii.82. Several females collecting pollen on *Erodium cicutarium* (L.) L'Hérit and *Cochlearia* sp. flowers, Wire Hills, 10.v.84.
Sphecodes fasciatus von Hag. Uncommon. Wire Hills.

Andrenidae

Andrena scotica Perkins. Rare. At *Eryngium* near Hut, male (7.viii.75) and female (9.viii.75) (S.A. Corbet).

Colletidae

Colletes fodiens (Geoff. in Fourcr.). Common on *Senecio* flowers.
Colletes halophilus Verhoeff. A large colony existed for many years on Butcher's Beach (between Missel and Hut Marsh), on shingle in an area of eroded dunes colonized by scattered plants of *Suaeda fruticosa*, *Halimione portulacoides* (L.) Aell., *Limonium bellidifolium* (Gouan) Dum., and *L.binervosum* (G.E. Sm.). Males were observed feeding on *Erodium* and *L.binervosum*, and females were observed on *Aster tripolium* (7–11.viii.75, 17–19.ix.78). The nesting area was reached by the highest spring tides: for example on 10.viii.75 and on 18 and 19.ix.78. On the morning of 19.ix.78, the tide was exceptionally high (7.7 m above Chart Datum (Immingham: Admiralty Tide Tables)) and the bees were observed trying unsuccessfully to get to their burrows that were submerged by two or three inches of seawater. Many bees were digging new burrows, higher up the bank in dry sandy areas. These bees were females, heavily loaded with *Aster* pollen. The bees have not been observed by us on Scolt since 1978. A large colony was found by P.W. Banham on a shingle area on Wells East Hills (TF 923455): two specimens seen by us (collected 25.ix.83). This colony is almost certainly still in existence. In September 1935, G.M. Spooner discovered large colonies of *C.halophilus* at Blakeney Point and Scolt Head Island, nesting in firm maritime sand (Richards, 1937). Both sexes visited *Aster tripolium* in large numbers, fewer being observed on *Limonium* and *Senecio*. On the continent, *C.halophilus* is also restricted to maritime sands and visits a range of dune flowers, although females primarily visit *A.tripolium* (Manning, 1955).
Hylaeus brevicornis Nyl. Adults never seen. From three bramble-stem nests collected from Long Hills, Wire Hills and Hut Bank in 1983 and 1984, seven female *H.brevicornis* and two *Perithous divinator* emerged.

Anthophoridae

Osmia leaiana (Kirby). Rare. One female flying around the Hut.

Megachile centuncularis (L.). Rare. One female, 31.vii.81.

M.leachella Curtis. Extremely common. Collecting pollen, especially from bramble blossom. June to August. Nesting in Hut Bank, Wire Hills, Norton Hills.

M.maritima (Kirby). Common.

M.circumcincta (Lep.). Recorded by Eisikowitch and Woodell (1975) visiting *Armeria*.

M.versicolor Smith. Rare. One female on dunes north of Cockle Bight on *Cirsium vulgare* (Savi) (S.A. Corbet).

Coelioxys vectis Curtis. Uncommon. Wire Hills, female, 3.vii.82; Hut dunes, male, 11.viii.78.

Apidae

Bombus lapidarius (L.). *B.terrestris* (L.). *B.audax* (Harris). All three species common. All three recorded visiting *Armeria* by Eisikowitch and Woodell (1975).

B.pascuorum (Scop.). Common.

B.pratorum (L.). One male, 1.vii.82.

B.muscorum (L.). Two workers, 3.viii.79 (P.H. Williams).

B.distinguendus Morawitz. Listed by Ellis (1960).

Psithyrus rupestris (F.). Listed by Ellis (1960).

P.vestalis (Geoff. in Fourcr.). Listed by Ellis (1960).

Apis mellifera L. Very common.

Discussion

Like most small exposed coastal sand dune systems in the UK, Scolt Head Island contains few species of bees and wasps in comparison with other types of sandy areas. The total list includes 47 species, of which 36 are solitary and 11 social. Three-quarters of the solitary species are ground-nesters and only four rare species nest in dead wood. Three species nest in bramble stems, an abundant resource on Scolt. These bramble nesters chose mainly fairly thick, old, dead stems, but ones which still bore a protective 'bark' and prickles, preventing rotting. Older bramble is present on Long Hills, Wire Hills and Hut Hills. The House Hills area has been burnt recently and bears mainly young sprawling brambles, unsuitable for aculeates.

It is unlikely that any abundant species has been overlooked. A few more species, for example *Astata pinguis* (Dahlb.) (Sphecidae), are probably present, and others might perhaps be found by spring collecting or by visiting Norton Hills. Particularly noticeable was the lack of spring bees on our two May visits, both of which were unusually hot days. Only *Lasioglossum punctatissimum*, *Bombus* spp. and a few male sphecids were visible. Although there were no suitable shrubs with many flowers per plant (e.g. *Salix*, *Prunus*), huge numbers of *Taraxacum* spp., *Armeria maritima*, violets and several small dune species (e.g. *Erodium*, *Cochlearia*) were present.

The dunes are obviously not as stable as inland heaths, but the main reason for the low number of species is probably exposure. There is relatively little shelter from the ever-present winds, except at the base of the larger dunes, so that conditions are poor for flying insects. Eisikowitch and Galil (1971) noted the adverse effect of exposure to sea winds on the pollination of a coastal plant in Israel *Pancratium maritimum* L. (Amaryllidaceae): the hawkmoth pollinator could fly only at the rare times when the

wind speeds were less than 2–2.5 m/s. It is possible that many of the plants on the island are wind- or self-pollinated, or reproduce asexually, as Moldenke (1976) found in Californian coastal plant communities. Any significant pollination by bees on Scolt will be by generalist thermoregulatory bumblebees and later also by the abundant *Megachile leachella* and perhaps *Apis, Colletes* and other *Megachile* species.

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The Carabidae (Coleoptera) of Fennoscandia and Denmark. By the late Carl H. Lindroth. Leiden, E.J. Brill/Scandinavian Science Press, Fauna Entomologica Scandinavica Volume 15 Part 1, 266 pages, 1985, Gld 80 (approx £24.50) and Part 2, 272 pages, 1986, Gld 80 (approx £24.50).

Fauna Entomologica Scandinavica has established itself as one of the most important series of entomological books being published in Europe. This volume